2.17 AREAS OF INTEREST/RESPONSIBILITY

Areas of interest (AOIs) or areas of responsibility (AORs) shared by multiple platforms are often defined in military operations and represent an important C3 modeling capability. In this discussion, we define AOIs in the more general sense to include not only two-dimensional areas such as national borders and other geographical boundaries but also three-dimensional zones (volumes) such as fighter engagement and surface-to-air missile (SAM) engagement zones. AOIs may be defined in fixed geographical coordinates or relative to the location of a particular platform.

2.17.1 Functional Element Design Requirements

a. The model will provide the user with the capability to define any number of AOIs either in terms of stationary geographic coordinates or relative to a specific scenario player.

b. The user-defined AOIs may be used to define resource allocation tactics such as target assignment and target engagement decisions.

2.17.2 Functional Element Design Approach

In Suppressor, a zone is used in the decisions of whether to send target intelligence, perform RESOURCE-ALLOCATION procedures (e.g. assign, engage, disrupt, etc.), or reactively maneuver.

Design Element 17-1: Zone Definition

A zone's shape and reference point are defined in an SDB PLAYER: definition. The first characteristic defined is whether the zone is STATIONARY or RELATIVE. STATIONARY zones are non-moving zones defined with absolute Cartesian or Latitude/Longitude coordinates. RELATIVE zones are defined relative to some point or player in the scenario region. If the reference is a player which moves, then the zone will move and rotate along with him. The two types of zones are described in detail below.

c. STATIONARY - One first must define the top and the bottom of the zone. These are altitude values relative to mean-sea-level or to the altitude of the terrain. Then, the planar shape of the zone is defined. This can be done by specifying Cartesian coordinates, which are relative to the center of the scenario, or Latitude/Longitude values. In either case, the shape is the polygon formed by connecting the points.

d. RELATIVE - This type of zone provides Suppressor with much flexibility. First of all, the reference (origin) of the zone can be either:

   1. a location of the player owning the zone, or
   2. a location of any other player (friend or foe) in the scenario, or
   3. a named checkpoint on the owning player's flightpath, or
   4. an arbitrary point in the scenario space.

Secondly, alternatively to the polygon shape described for STATIONARY zones, the planar shape of a RELATIVE zone may be circular (or some derivation thereof such as donut-shaped, pie wedge, etc.). This is accomplished by defining minimum and maximum

ranges from the reference point, then optionally specifying limiting angles relative to the heading vector of the reference. Finally, the zone's top and bottom can be defined relative to the reference point, therefore allowing the zone to move vertically as well as horizontally with the movement of the reference.

For either of the two zone types described above, if an individual zone is used by several players, then it can be defined once in the SDB data item DEFINED-SHARED-ZONES and then referenced by each of the owning players by including a USE-SHARED-ZONE data item.

As mentioned above, zones are used as inputs to several tactical decision making activities. These activities include:

a. Determining if reporting intelligence on targets is appropriate. By including the TDB TACTIC input ZONE-CHARACTERISTICS, the user can define, on a per zone basis, whether he has the permission to report on targets in that zone which he detects with his own sensors (SNR-RPT-OK) or which he has been told about (MSG-RPT-OK).

b. Evaluating whether to perform a resource allocation. In the TDB TACTIC RESOURCE-ALLOCATION procedures, there are several criteria which test for inclusion within a zone. Testing for a specific target in a zone can be accomplished by using the 3D-TGT-LOC criterion. To determine the number of targets within a zone one can use TOTAL-APPROACHING-TARGETS or TOTAL-TARGETS. Testing whether the intercept point of an attacker and the target is within a zone is accomplished by using TGT-INTERCEPT-LOC. Finally, one can test if the resource itself is within a zone using RESOURCE-LOC.

c. Evaluating whether to perform a reactive maneuver. In the TDB TACTIC MOVE-PLANS, there are several conditions which test for inclusion within a zone. The condition MY-LOC tests whether the attacking player is within a certain zone and has the same meaning as RESOURCE-LOC mentioned above. TGT-INTERCEPT-LOC and 3D-TGT-LOC, as described above, determine if the intercept position or the current target position, respectively, are within the named zone.

2.17.3 Functional Element Software Design

Zone Definition Module Design

The software which checks for player inclusion within a zone is contained within the module VOLUME:

```
*look up coordinates and altitude capability;
*loop, while regions must be checked:
   *check for permission, if necessary;
   *when permission type ok for zone:
      *when zone is relative:
         *when reference point defined:
            *reset zone reference;
         *but, when reference player defined:
            *when player is a friendly perception and alive:
               *get updated location;
```

```
            *but, when player is a target perception:
               *calculate target velocity and updated location;
            *otherwise, skip to next zone;
            *end of test for player is a friendly perception.
         *but, when checkpoint specified but not found in path:
            *skip to next zone;
         *end of test for a reference found.
         *modify target location;
         *when rectangular or lat/lon coordinates:
            *rotate relative zone to align with heading;
         *otherwise, circular coordinates (and not full circle):
            *rotate relative zone to align with heading;
            *adjust angles into [-pi,pi];
         *end of test for coordinate type.
      *end of test for relative zone.
      *when point is within circle or using circular coordinates:
         *when either altitude limit is in AGL:
            *determine altitude of terrain at this point;
         *end of test for AGL limits.
         *modify lower limit if it is AGL or REF;
         *modify upper limit if it is AGL or REF;
         *when point within altitude limits:
            *when rectangular or lat/lon coordinates:
               *invoke logic to check for point within zone;
            *otherwise, circular coordinates:
               *when target within specified 2D range band:
                  *when not full circle:
                     *when target and reference point different:
                        *when start angle is cntr. clockwise from stop:
                        *when stop angle is cntr. clockwise from start:
                        *end of test for angle relationships.
                     *end of test for different target/reference point.
                  *end of test for full circle.
               *end of test for 2D range band.
            *end of test for coordinate type.
         *end of test for within altitude limits.
      *end of test for within circle.
   *endif (zone permission is OK)
*end of loop for regions.
```

2.17.4 Assumptions and Limitations

None.

2.17.5 Known Problems or Anomalies

None.